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instrumentation and software for research

RADIAL ARM MAZE

MED-STATE NOATATION™ PROCEDURE
SOF-700RA-6
USER'S MANUAL

DOC-132
Rev. 1.2

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notes

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CHAPTER 1 | INTRODUCTION

MED-PC gives researchers the ability to use pre-programmed applications such as Radial Arm Maze to make data collection easy. These pre-programmed applications can also be modified to meet the evolving needs of a research protocol. This manual provides step-by-step instructions on how to use this pre-programmed application and how to save and view the data files.

Overview of the Procedures

The Radial Arm Maze procedures (Radial Arm Maze 1.mpc and Radial Arm Maze 4.mpc) provide for a user-defined adaptation time and session test time. The test session ends when the animal has fully explored all eight runways, or at the end of the user-defined session time, whichever comes first. The standard data collection includes the number of zone entries, time spent in each zone and "end counts" in each runway. Additional data includes total runways correct, total runway errors, the sequence of runways entered, and the elapsed time in seconds to runway completion.

Radial Arm Maze 1.mpc should be used with systems that include Automatic Guillotine Doors, two IR Pairs at the entrance of each Runway, and Head Entry Detectors at Food Cup.

Radial Arm Maze 4.mpc should be used with systems that include Automatic Guillotine Doors, two IR Pairs at the entrance of each Runway, Head Entry Detectors at Food Cup, and Pellet Dispensers.

Installing the Software

Please refer to the **MED-PC IV User's Manual** for a complete guide to installing the MED-PC IV software, building a valid Hardware configuration with the Hardware Configuration utility, and opening and compiling a MSN procedure in the Trans-IV utility.

To install the Radial Arm Maze Data Collection Procedures, insert the CD into the CD-ROM drive and click **Install the Radial Arm Maze Software**. The Radial Arm Maze Data Collection procedures are copied into the C:\MED-PC IV\MPC folder.

Backing Up the Software

Med Associates strongly encourages creating backup copies of the programs in case of disk failure. Having copies of the original programs may be useful in the future should modifications be made to the existing programs.

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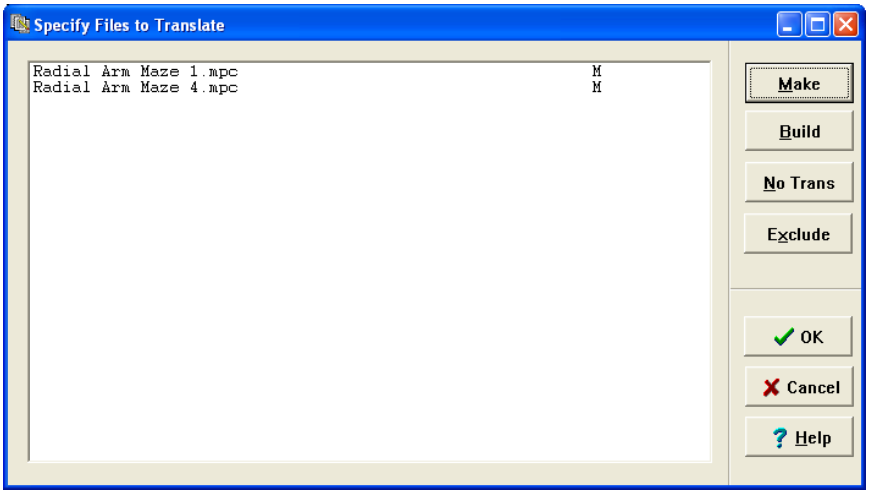
CHAPTER 2 | BEGINNING & RUNNING AN EXPERIMENT

Translating the MED-PC IV (.mpc) File

Programs written in MedState Notation must be translated using Trans IV before they can be executed in this application. Be sure that a copy of the file being translated is present in the directory "C:\MED-PC IV\MPC\." Open Trans IV icon and select **Translation** | **Translate and Compile**.

Select the program(s) to use for the experiment and click **Make**. Click **OK** to start the translator, and it will automatically parse the MedState Notation and then open to a DOS screen to compile the Pascal code. Depending on the speed of the computer, each of these steps may not be seen. If any problems are encountered during this process, refer to the on-screen help menu or the **MED-PC Version IV User's Manual**, or contact MED Associates, Inc. for assistance.

Figure 2.1 - Trans IV Control Panel for Translating and Compiling MedState Notation Code



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Using the MED-PC IV Load Wizard

MED-PC IV is designed to help the researcher run an experiment by guiding selection choices through its Experiment Loading Wizard. This section will describe how to initiate the Radial Arm Maze 1.mpc application, however the following steps that will also apply to all other .mpc procedures.

Open MED-PC IV and the MED-PC Experiment Loading Wizard's Welcome screen, shown in Figure 2.2 will appear.

Figure 2.2 - The MED-PC IV Loading Wizard Welcome Screen

MED-PC Experiment Loading Wizard
Welcome
This wizard will guide you through starting experiments and setting session parameters.
Run this expert automatically when starting MED-PC.
Close
Next

To avoid this load wizard, deselect the checkbox labeled **Run this experiment automatically when starting MED-PC**. Close this screen by clicking the **Close** button. Closing this screen immediately reveals the MED-PC Run-Time Screen shown in Figure 2.9. If the choice to continue with the Loading Wizard is made, then click the **Next** button.

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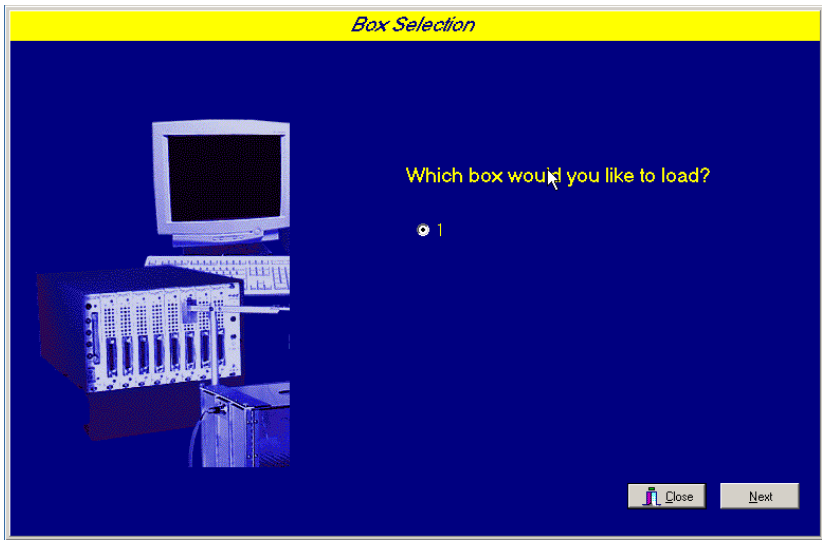
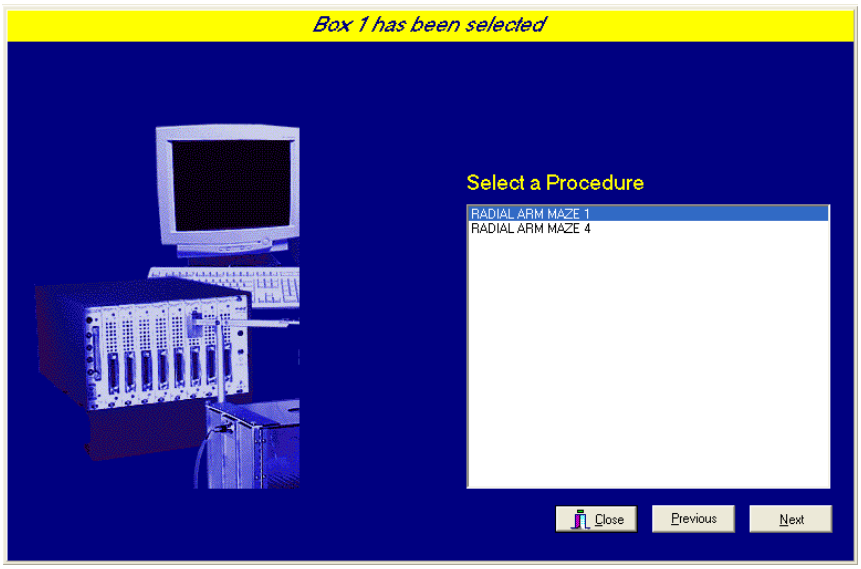
The Box Selection screen will appear next, as shown in Figure 2.3. From this screen the researcher chooses which boxes will be used in the experiment. Select the boxes that will run the experiment by clicking in the radio button next to the box number. The figure shows that the Hardware Configuration included only 1 box, which was selected. Click **Next** to continue.

Figure 2.3 - The Box Selection Screen



The Select a Procedure screen appears next, as seen in Figure 2.4. This is where the application to be run is selected. The screen displays a list of all the currently compiled procedures. Select the desired procedure and then click **Next**.

Figure 2.4 - The Select a Procedure Screen



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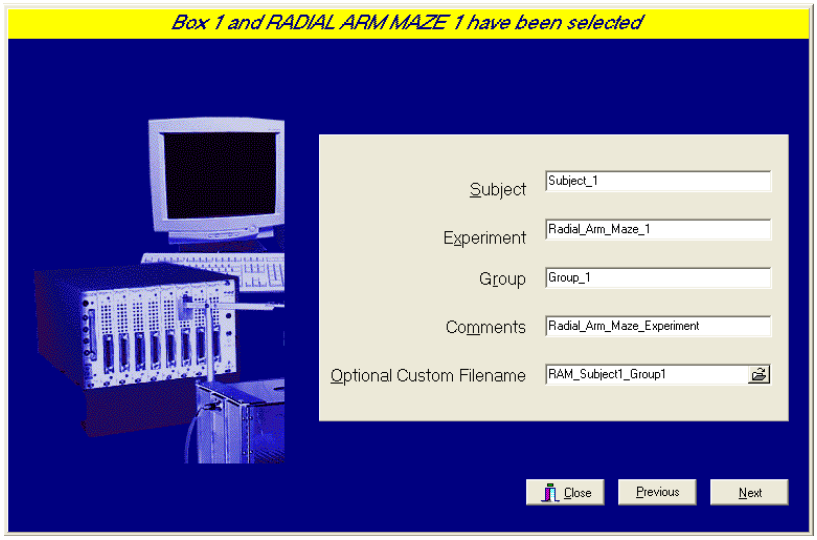
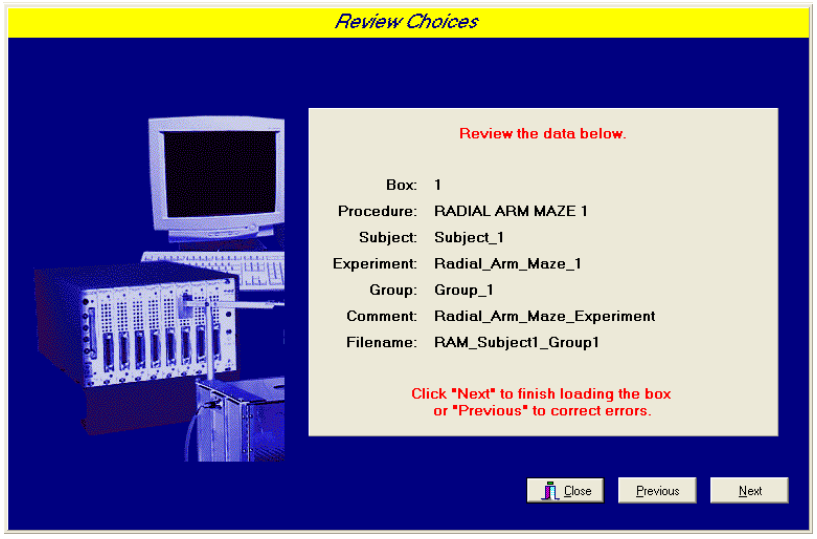
The Enter Experiment Data Screen should display next, as shown in Figure 2.5. The purpose of this screen is to allow annotations to be added to the data file that is produced by MED-PC IV. These annotations will help identify the Subject, Experiment, and Experiment Group upon which data was collected. Comments can be added here as well, and the data file can be given a customized file name to help identify it from other data files. Enter the information desired, and click **Next**.

Figure 2.5 - Enter Experiment Data Screen



The next screen to appear is the Review Choices screen, as seen in Figure 2.6. This is a method of confirming that the information received from the Box/Procedure Selected is correct. If it is not correct, select **Previous**, and edit the data. If it is correct, select **Next**.

Figure 2.6 - Review Choices Screen



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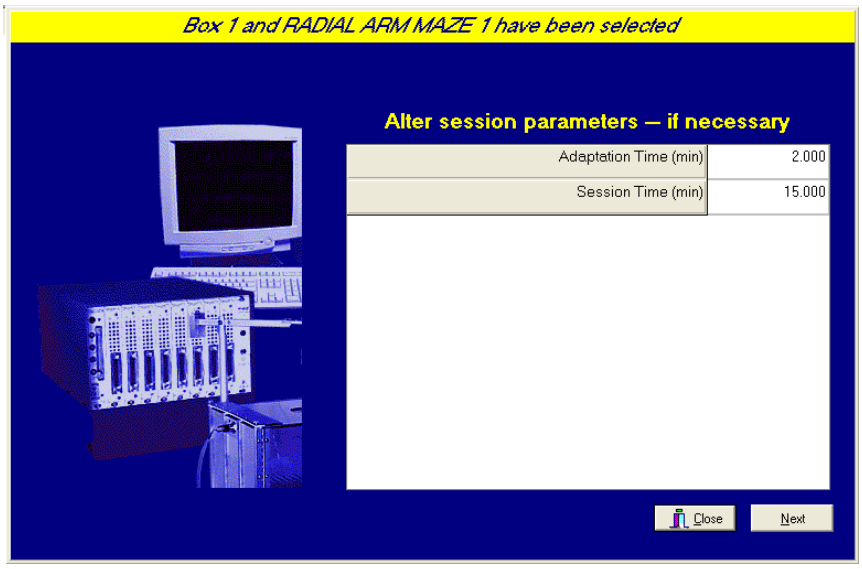
The Alter Session Parameters Screen, shown in Figure 2.7, is the next screen to appear, and is an important screen for the researcher. The Alter Session Parameters screen allows the researcher to alter the parameters by which a procedure executes. The Send Start Command Screen appears next. The options available on the screen vary depending upon how many boxes are described in the Hardware Configuration.

Figure 2.7 - Alter Session Parameters Screen



In this example only 1 box is described in the Hardware Configuration, so Figure 2.8 will appear next. If more than 1 box is in the Hardware Configuration, then Figure 2.9 will appear.

Figure 2.8 - Send Start Command Screen for Single Box Configuration

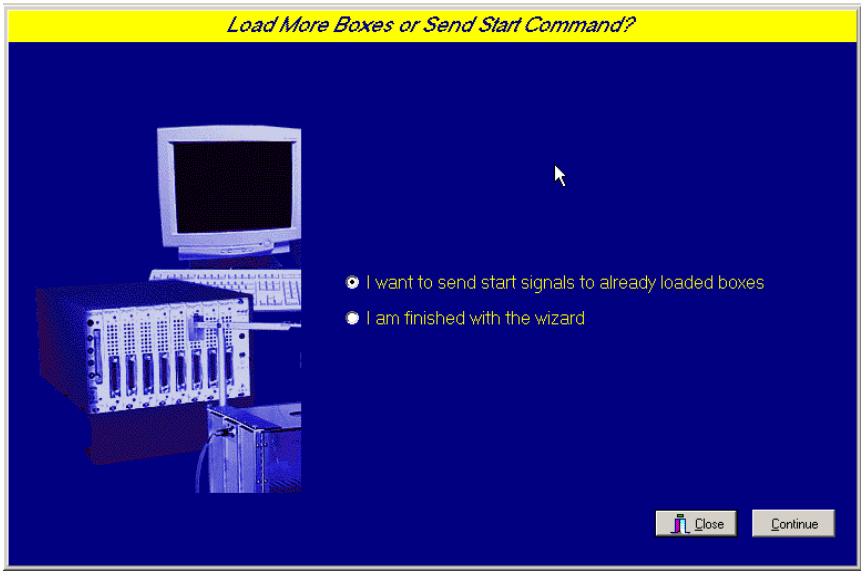

Load More Boxes or Send Start Command?
I want to send start signals to already loaded boxes
I am finished with the wizard
Close
Continue

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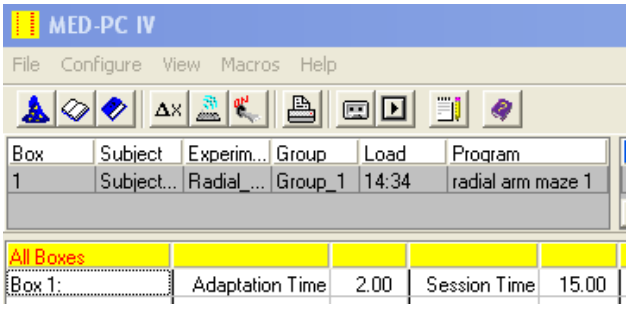
Figure 2.9 - Send Start Command Screen for Multiple Box Configuration

Load More Boxes or Send Start Command?
I want to load more boxes
I want to send start signals to already loaded boxes
I am finished with the wizard
Close
Continue

In both cases (Figure 2.8 and Figure 2.9), the screens are where the researcher decides to either load more boxes, send a start signal to boxes that are already loaded, or enter the MED-PC IV run-time environment without sending a start signal by selecting "I am finished with the wizard". This option results in the screen shown in Figure 2.10.

Figure 2.10 - The MED-PC IV Run-Time Screen


MED-PC IV
File Configure View Macros Help
Box Subject Experim... Group Load Program
1 Subject... Radial_... Group_1 14:34 radial arm maze 1
All Boxes
Box 1: Adaptation Time 2.00 Session Time 15.00

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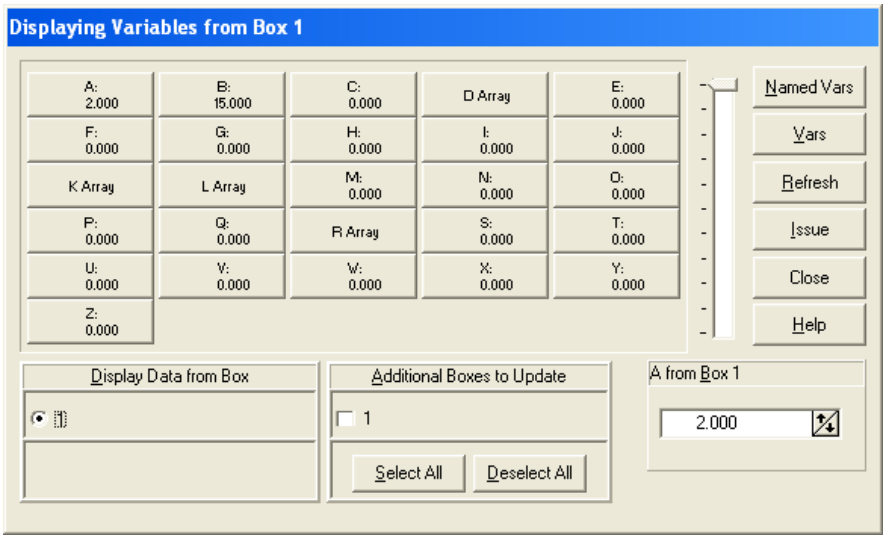
Viewing/Changing Variable Values

Before a "start command" has been issued, any variable may be changed on the MED-PC IV run-time screen. Simply highlight the value to change, and then enter the new value. Once a session is in progress, change variables by selecting **Configure** | **Change Variables**, or click the 4th tool bar item **ΔX**. In the lower left hand corner of the Change Variables window, find the "Display Data from Box" display, and choose the chamber(s) to modify. By clicking additional boxes in the "Additional Boxes to Update" section, changes made to a single box are automatically loaded to all of the selected boxes.

Figure 2.11 - Changing Variables Screen



The value of any simple variable may be viewed from this screen by clicking an array on the table and each element in that array can be viewed, as shown in Figure 2.12. To change a value, simply highlight and replace the value in the lower right hand box or use the up/down arrows to increment by 1. Click the **Issue** button for the change to take effect. Click **Named Variables** to produce the display in Figure 2.13. Change variables here as needed.

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Figure 2.12 - Displaying Array D from Box 1

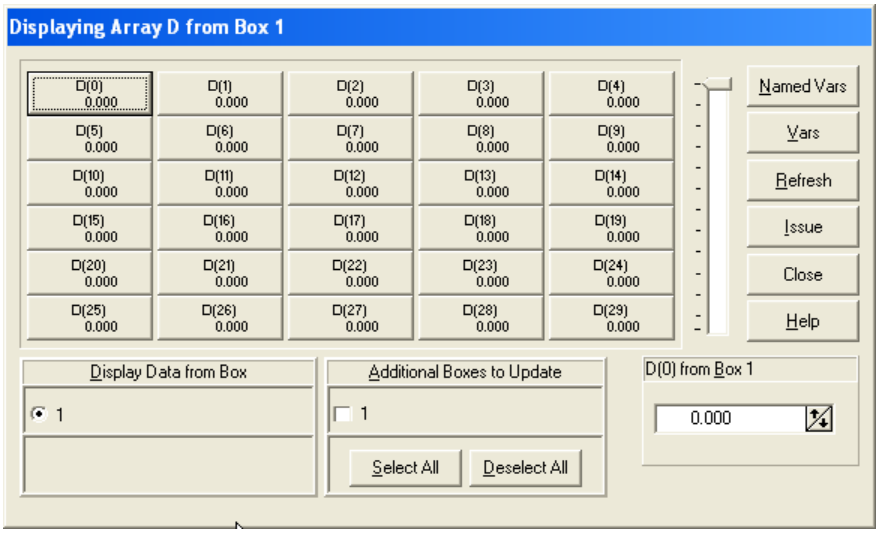
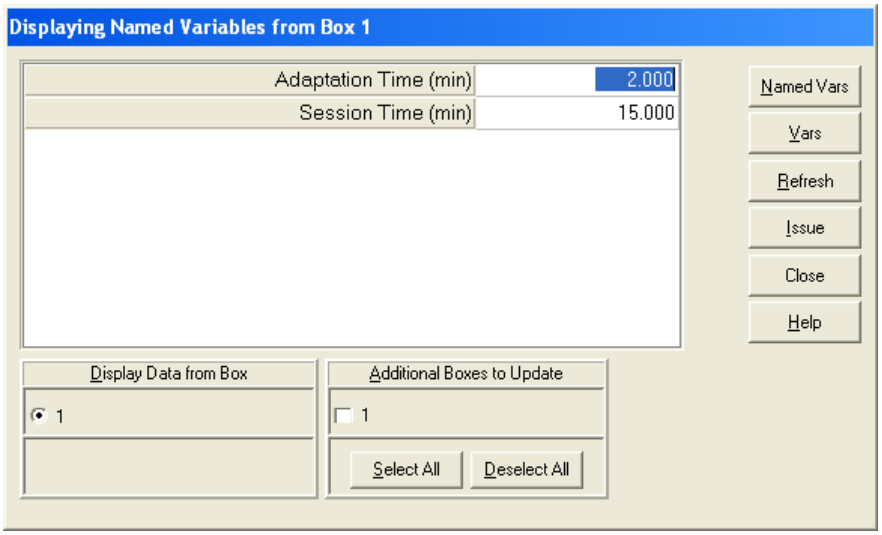


Figure 2.13 - Displaying Named Variables from Box 1



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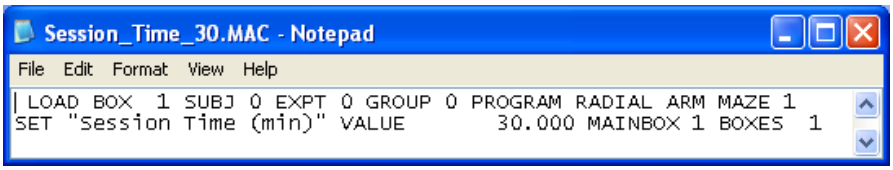
Macros

The simplest way to initially create a macro is to record keyboard functions while performing the steps manually. Once the commands are in the macro, it is easy to create a number of macros with the macro editor. The following example illustrates the process of loading "Box 1" and changing the Session Time to 30.

To begin, open MED-PC IV and going directly to the run time screen. Close the load wizard, if present. Before loading or opening the procedure, click **Macro** on the main menu and select **Turn On Macro Recorder** or click the 8th tool bar item with the cassette tape icon on top. A note on the bottom of the display indicates that the recorder is running. Open "Radial Arm Maze 1.mpc" by clicking **Files** | **Open Session**. Change the variables using any of the methods described above. When all settings have been made, turn the recorder off again by using the main menu or tool bar. Save the macro with a distinctive name. The example in Figure 2.14 was named "Session_Time_30.mac" since the Session Time was changed to 30.

Figure 2.14 – Session_Time_30.mac


Session_Time_30.MAC - Notepad
File Edit Format View Help
LOAD BOX 1 SUBJ 0 EXPT 0 GROUP 0 PROGRAM RADIAL ARM MAZE 1
SET "Session Time (min)" VALUE 30.000 MAINBOX 1 BOXES 1

Once this macro is built, use the macro editor to make simple changes such as replacing reward or correct lever values. Review the Help file on screen or the **MED-PC IV User's Manual** for more information on macros and the features offered. A START command or message box followed by a START command could be added to the macro (it was left off here so changes could be verified before starting the procedure).

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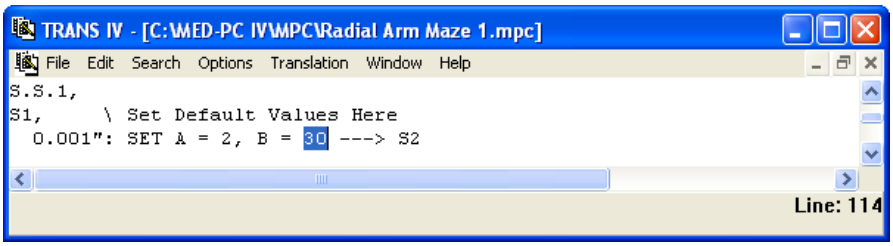
Modifying the MedState Notation Code

Permanent changes to the Radial Arm Maze 1.mpc procedure can be made to the MedState Notation code. To make the same change to the Session Time as shown above, do the following. Open Trans IV and select **File** | **Open** to place Radial Arm Maze 1.mpc into the text editor. Scroll down to approximately line 114 (note the line counter in the lower right hand corner of the editor) to reveal the code shown in Figure 2.15.

Figure 2.15 – Radial Arm Maze 30 min Session.mpc Lines 114


TRANS IV - [C:\MED-PC IV\MPC\Radial Arm Maze 1.mpc]
File Edit Search Options Translation Window Help
S.S.1,
S1, \ Set Default Values Here
0.001": SET A = 2, B = 30 ---> S2
Line: 114

Change B =15 to B =30 and save the changes with the same or a new file name such as Radial Arm Maze 30 min Session.mpc. Remember, if creating a new .mpc file name and are using a macro to load boxes, the file name in the macro also must be changed. Translate and compile the new or changed file as described previously and run MED-PC IV. Use the "Change Variables" screen to view/confirm the new values.

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CHAPTER 3 | UNDERSTANDING THE DATA FILES

Unless otherwise specified, data will be saved to C:\MED-PC IV\DATA. Data can be saved manually by selecting **FILE | SAVE DATA MANUALLY** or **FILE | SAVE DATA (FLUSH)**. The file name that is used to save the data in depends on the option that was chosen in the Hardware Configuration Utility and may also be dependent on the Subject, Experiment, and Group name provided in the MED-PC IV load wizard. Within each data file, the headings are created for each Subject, Experiment, Group, Box, etc., (see below). Data files may be opened with note pad, word pad, or any word processor or spreadsheet; however, be sure they are always saved "unformatted" in case a data extraction utility such as MED-PC to Excel might ever be used. Data file formats are explained in detail in the **MED-PC IV User's Manual**.

Sample Data File

```
File: C:\MED-PC IV\DATA\!2008-03-23


Start Date: 03/23/08      -- Date that the program started


End Date: 03/23/06            -- Date that the program ended
Subject: Animal 1             -- Subject name
Experiment: Experiment 1      -- Experiment name
Group: Group 1                -- Group name
Box: 1                        -- Box in MED-PC IV that the program ran
Start Time: 16:23:38          -- Time that the program started
End Time: 16:36:26            -- Time that the program ended
MSN: Radial Arm Maze 4        -- Name of the program that created this file
A:       2.000                -- Adaptation Time
B:      15.000            -- Session Time
C:       0.000            -- Not Used
E:     564.000                -- The Session Time that the program ran in seconds
F:       4.000                -- Internal variable to help with the control of the
program.  Value not important

G:       8.000                -- Runways Correct.  Number of Runways completed
                           successfully/Number of Pellets
                           -- earned
H:       3.000                -- Runway Errors.  Number of Runways the animal
repeated/completed a second time
I:      10.000            -- Internal variable to help with the control of the program.
Value not important
J:       0.000                -- Runways Incorrect.  Number of Runways completed that
were not baited
M:       0.000                -- Not Used
N:       0.000            -- Not Used
O:       0.000            -- Not Used
P:       0.000                -- Not Used
Q:       0.000            -- Not Used
T:       8.000                -- Number of baited arms
U:       0.000                -- Not Used
V:       0.000            -- Not Used
W:       0.000                -- Not Used
X:       0.000                -- Not Used
Y:       0.000            -- Not Used
Z:       0.000            -- Not Used

-- Array D holds the experiment values for what the animal did in each Runway.
--   The first four elements in the array are the values for the Hub.
--   The next four elements are the values for the first arm.

              Arm #                    # of       Time in               # of
D:                          Entries          Hub/Runway      Head Entries
```


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```
     0:        0.000       12.000      158.500        0.000  -- Hub,   12 Entries,
158.5/60 = 2.64 min
     4:        1.000        2.000       54.400        3.000  -- Arm 1,  2 Entries,
54.4/60 = 0.91 min
     8:        2.000        1.000       38.800        1.000  -- Arm 2,  1 Entries,
38.8/60 = 0.65 min
    12:        3.000        2.000       70.500        2.000
    16:        4.000        2.000       47.000        1.000
    20:        5.000        1.000       46.500        1.000
    24:        6.000        1.000       46.700        1.000
    28:        7.000        1.000       43.400        1.000
    32:        8.000        2.000       60.000        2.000
-- Array K holds the sequence that the Runways were completed.
--   An entrance into an arm does not mean the arm was completed.
--   A Head Entry has to be made in order to be counted here.

K:
     0:        1.000        5.000        3.000        6.000
     4:        3.000        8.000        7.000        8.000
     8:        2.000        4.000


-- Array L holds the time each Runway was completed in seconds from when the Session
started.
--   (i.e. Does not include the Adaptation Time.)

L:
     0:       40.000      104.000      149.000      236.000  -- Arm 1, completed 40
                                                             seconds after start;  Arm 5,
                                                             completed 104 seconds after
                                                             start
     4:      259.000      317.000      376.000      474.000
     8:      518.000      564.000


-- Array R elements 1 - 8 tell the program which Runways have been completed.
--   A value of 1 indicates that the Runway was completed (i.e. a Head Entry had been
made).
--   Elements 0 is Not Used.
--   Elements 9, 10, and 11 are internal variables that help with the control of the
program.  Values not important.

R:
     0:        0.000        1.000        1.000        1.000
     4:        1.000        1.000        1.000        1.000
     8:        1.000        4.000        4.000       12.000


-- Array S elements 1 - 8 tell the program which Runways are baited.
--   A value of 1 means that the Runway was baited.
--   Element 0 is Not Used.

S:
     0:        0.000        1.000        1.000        1.000
     4:        1.000        1.000        1.000        1.000
     8:        1.000
```

Appendix A | Contact Information

Please contact MED Associates, Inc. for information regarding any of our products.

Visit our website at www.med-associates.com for contact information.

For technical questions, email support@med-associates.com.

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